PIXAR
ANIMATION STUDIOS

Pixar's RenderMan Artist Tools™

RenderMan® is the film industry's standard image synthesis software. It has earned this reputation because it is fast, powerful, configurable and programmable. RenderMan is the only renderer available that is robust enough to create a feature film.

Pixar's RenderMan Artist Tools incorporate technical lessons learned by Pixar in their creation of the first fully computer-animated feature film, *Toy Story*. Pixar has developed a suite of RenderMan Artist Tools to provide film makers with easier access to the powerful features of RenderMan.

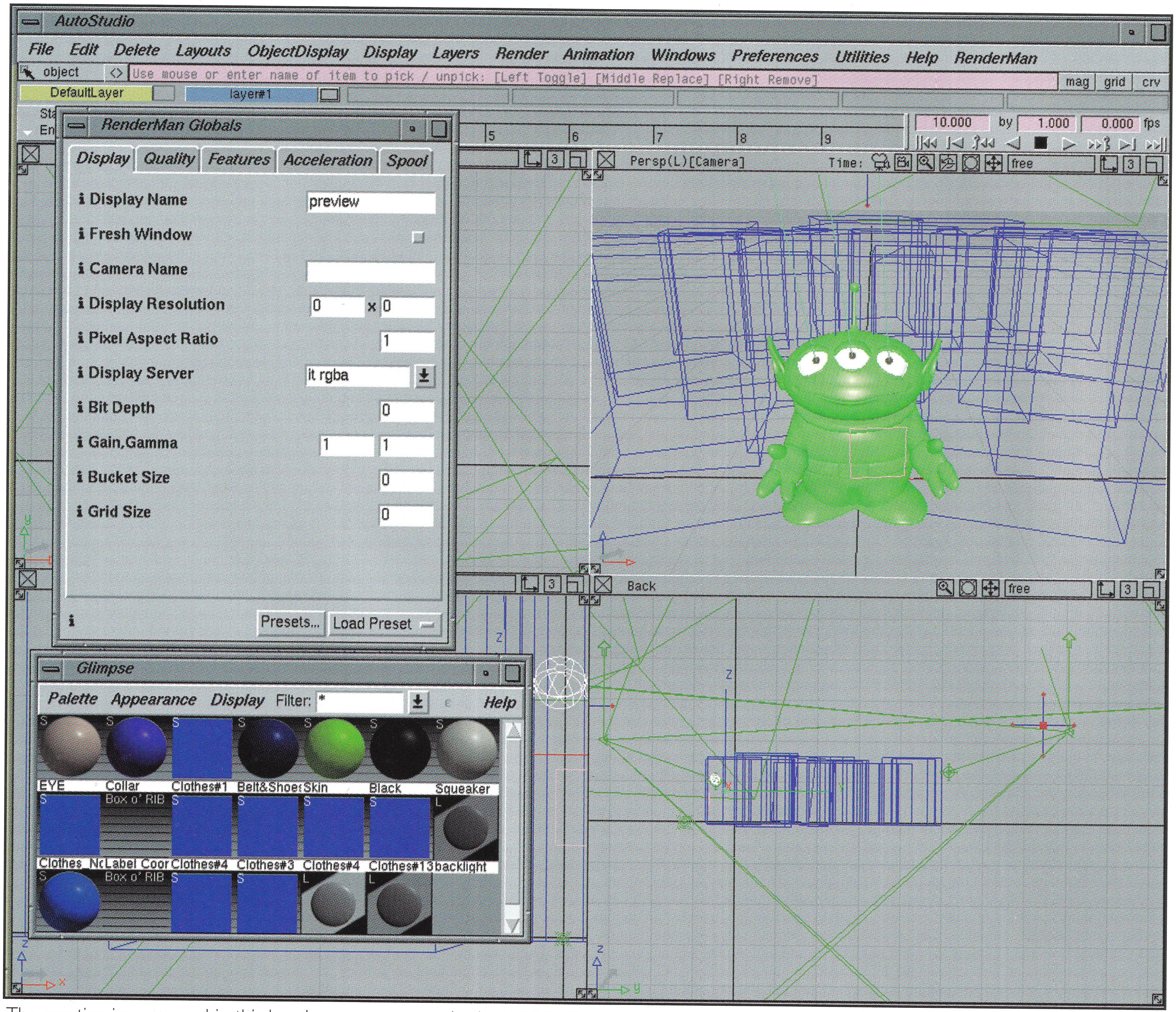
The suite of tools includes:

ATOR - Alias-to-RenderMan plug-in for Alias PowerAnimator V7.0.
Glimpse - Interactive editing of Materials and Surface Appearances.
Alfred - Powerful application that manages remote batch rendering.
Pixar's RenderMan Toolkit - Academy Award winning rendering software.
Combiner - Compositing application for combining images.

ATOR™ - The Alias-to-RenderMan Connection

ATOR is a plug-in to Alias PowerAnimator which was developed using OpenAlias. ATOR's principal function is to attach RenderMan specific information onto Alias objects. ATOR interprets Alias information and uses Alias controls to bring RenderMan power to the digital artist. Since much of the power of RenderMan is embodied in its support for appearances, it is ATOR's primary goal to allow for rapid specification and modification of shaders, shader parameters, and the association of shaders with Alias models.

ATOR's tight integration with Alias makes it possible for non-programming users to create impressive RenderMan productions. These features are provided without compromising the technical control required by RenderMan power users.


AutoStudio
File Edit Delete Layouts ObjectDisplay Display Layers Render Animation Windows Preferences Utilities Help RenderMan
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Use mouse or enter name of item to pick / unpick: [Left Toggle] [Middle Replace] [Right Remove]
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Display Name: preview
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Camera Name:
Display Resolution: 0 x 0
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The martian images used in this brochure were created using ATOR. This image shows that work in progress, including a view of the Glimpse appearances palette and the RenderMan Globals dialog.

ATOR features include:

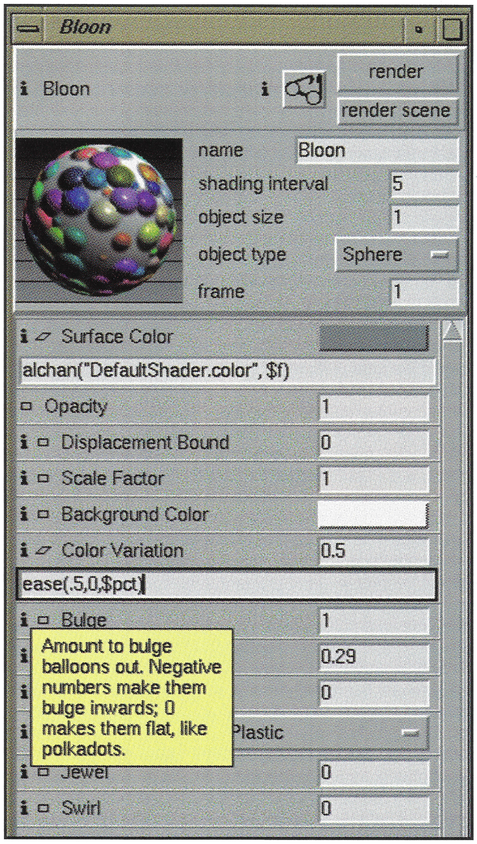
- Shader Attachment and Organization
- Shader Parameter Editing and Animation
- Automatic Shadow, Reflection and Environment Map Computation
- Optimized RenderTuning Workflow
- RenderMan Option/Attributes Control
- Sophisticated Network Rendering Job Control
- Rendering Asset Tracking and Distribution
- Plug-in Architecture for RIB Generators (AliasParticle System Converter)

This image was created by Big Rain. in Seattle, Washington.

Glimpse™ - Interactive Editing of Materials and Appearances

ATOR includes an interactive tool, called Glimpse, for editing RenderMan appearances. Using Glimpse, appearances can be edited, previewed and organized into palettes for ease of reference.

Glimpse allows for editing all the parameters associated with an appearance and for animating those parameters. Animated textures are also supported. Users can create and save any number of palettes and can drag and drop appearances between palettes. For shader developers, Glimpse supports the shading language information file (SLI). These files allow the shader creator to specify and document appearances and parameters. For C and C++ programmers, Glimpse supports plug-ins for procedural RIB generation. These plug-ins can be loaded by Glimpse and provide a method for inserting chunks of RIB into the ATOR generated RIB files.



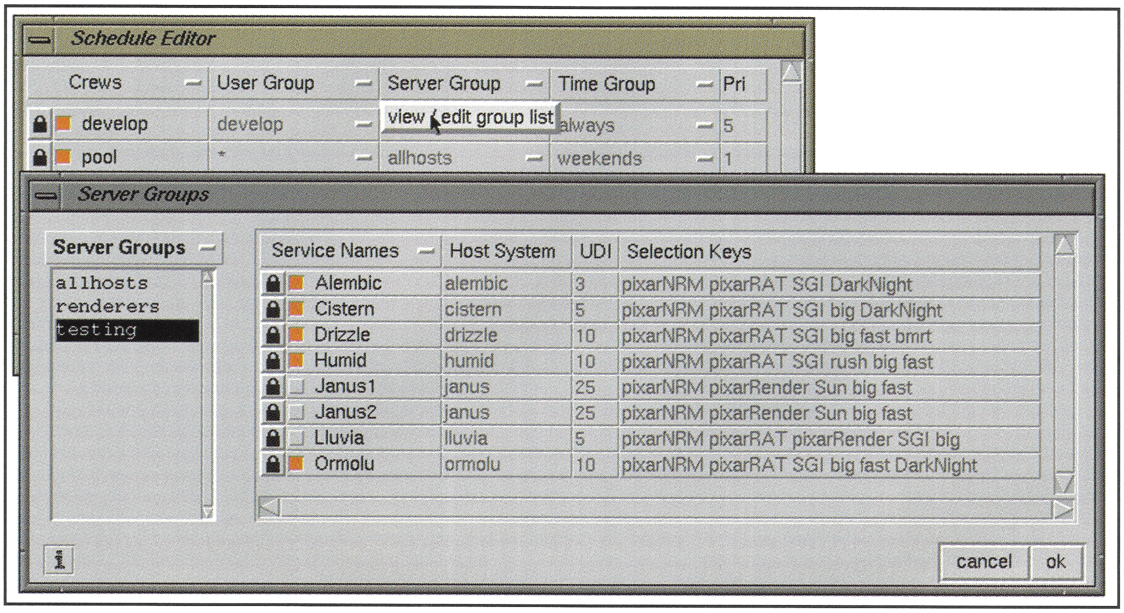
Bloon	
name	Bloon
shading interval	5
object size	1
object type	Sphere
frame	1
Surface Color	
alchan("DefaultShader.color", $f)	
Opacity	1
Displacement Bound	0
Scale Factor	1
Background Color	
Color Variation	0.5
ease(.5,0,$pct)	
Bulge	1
	0.29
	0
	Plastic
Jewel	0
Swirl	0

Amount to bulge balloons out. Negative numbers make them bulge inwards; 0 makes them flat, like polkadots.

Appearances are edited using Glimpse. Every parameter in the appearance can be modified, or animated. Collections of appearances can be saved in palettes for later use in other projects.

Alfred™ - The Network Rendering System Controller

Alfred is a task processing system specifically designed to manage network-distributed rendering. Alfred is useful for managing the execution of a long or complex sequence of dependent events. Alfred's command language allows the separable components of a final frame rendering, such as shadows or reflections, to be distributed to remote network renderers simultaneously thereby providing the fastest single frame rendering possible.



	Crews	User Group	Server Group	Time Group	Pri
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Server Groups
allhosts
renderers
testing

	Service Names	Host System	UDI	Selection Keys
🔒 🟧	Alembic	alembic	3	pixarNRM pixarRAT SGI DarkNight
🔒 🟧	Cistern	cistern	5	pixarNRM pixarRAT SGI big DarkNight
🔒 🟧	Drizzle	drizzle	10	pixarNRM pixarRAT SGI big fast bmrt
🔒 🟧	Humid	humid	10	pixarNRM pixarRAT SGI rush big fast
🔒 ☐	Janus1	janus	25	pixarNRM pixarRender Sun big fast
🔒 ☐	Janus2	janus	25	pixarNRM pixarRender Sun big fast
🔒 ☐	Lluvia	lluvia	5	pixarNRM pixarRAT pixarRender SGI big
🔒 🟧	Ormolu	ormolu	10	pixarNRM pixarRAT SGI big fast DarkNight

The Alfred maitre_d controls access to all the remote server resource requests from Alfred dispatchers. Selection keys define remote server capabilities. These resources are granted to requesting dispatchers based upon the user's requirements and priority.

Alfred also coordinates competing requests for shared resources, such as remote renderers, from multiple users around the network. A producer-controlled schedule file defines a resource white-board which specifies available machines, user groups, and access times. For example, a rendering job generated by ATOR checks out rendering servers from the shared pool as it needs them; if they are all in use, it will wait until an appropriate machine become available. Since requests are made using a straightforward pattern matching scheme they are independent of actual host names, hence system administrators can add or remove systems from the pool while jobs are executing. This hot-swappable approach, combined with user priorities and access times maximizes efficient renderfarm management.

Alfred is optimized for use with ATOR, for which it manages the complex tasks of distributing RenderMan assets and controlling the remote rendering workflow. In addition, developers can create Alfred savvy applications, or create distributed services that can be managed by Alfred. Alfred provides for progress notification, remote message collection, distributed clienting and automatic restart of tasks that have stopped due to errors.

Each Alfred job is executed on the individual user's machine, rather than by a dedicated central batch processor; as a result, many jobs can be active at the same time around the network. This distributed clienting model not only ensures that processing is done using individual user permissions, it also optimizes use of local processors and disks and provides a measure of fault-tolerance. When the centralized white-board facility (called the Alfred maitre'd) is used, it can typically run on a modest workstation since it only keeps track of server status and doesn't do any job processing.

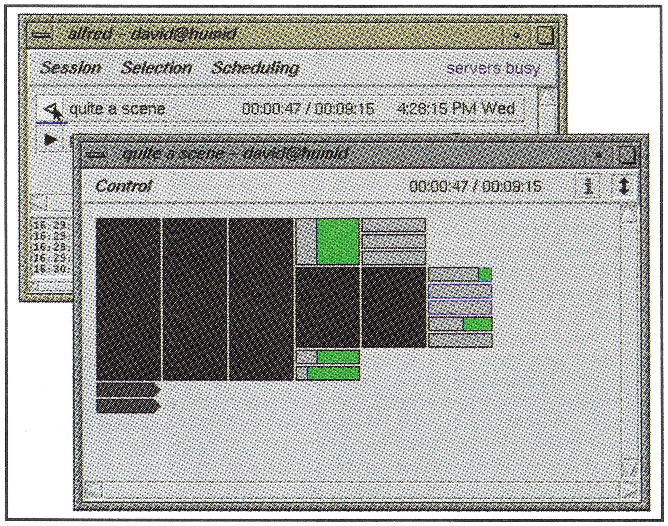
The Alfred system consists of these independent components:

The Alfred monitor which allows the user to see and control the current state of the job queue. The monitor has a built-in http interface which allows users to monitor and interact with their jobs using a web browser from anywhere on the network. A "wrangler" version of this interface allows an Alfred superuser to control the jobs of several users.

***The* Alfred dispatcher** which manages the job queue. The dispatcher reads the job worklist and executes the individual tasks. It can execute tasks and negotiate with the maitre'd when a job requires a remote server.

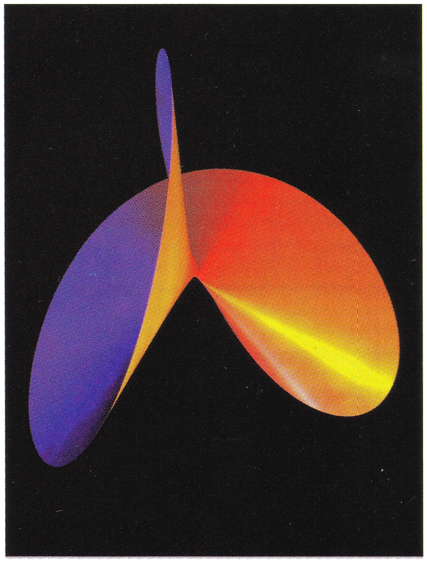
The Alfred maitre'd which is the centralized arbitrator. Maitre'd monitors a master white-board schedule which lists the available network services and determines which users have permission to use them.

Alfred NIMBY ("not in my back yard"). This is a small desktop utility which communicates with the maitre'd and blocks remote work from being dispatched to systems with interactive users. It allows remote work when the system is idle during screen saver mode.



Every user controls his own work queue via an alfred dispatcher. Each job in the queue window can be expanded to show a DAG node view of the job. Active jobs display continual progress and status messages.

Volumetric lighting effects can be created using a combination of the volumeFog and volumeSpot appearances.



This interesting image was created by Saty Raghavachary at Dreamworks Feature Animation. It is a slice through a 4D Reimann surface. The corresponding 3D slices appear to continuously morph through a sequence of fascinating shapes with self-intersections.

Pixar's RenderMan Toolkit™

RenderMan is the Academy Award-winning software used by motion picture and television studios to create realistic visual effects. Used in conjunction with popular modeling and animation software, Pixar's RenderMan has allowed digital studios to create landmark visual effects. Pixar's RenderMan was engineered from the onset to create the world's most compelling and highest quality computer generated images for use in feature film and television effects.

RenderMan images are free from the typical computer defects of aliasing, strobing and unrealistic visual simplicity. Instead, RenderMan images are capable of representing rich and subtle visual attributes such as materials and textures, the influence of various types of lights from multiple sources, shadows, camera effects and other features not properly described by shape alone.

Many of the films in which Pixar's RenderMan has been used have received Academy Awards for Special Effects, including *Terminator 2* and *Jurassic Park*. RenderMan has also been used to create the impressive effects in films such as *Men in Black*, *Contact* and *StarShip Troopers*.

This image was created by Big Rain. in Seattle, Washington.

Combiner™

Combiner is a script-based compositing application that is tightly integrated with ATOR, Alfred and RenderMan. During interactive operation, Combiner allows the user to specify any number of Still Frame, Image Sequence and Alias 3D input elements.

The Combiner scripting language is an extremely powerful tool for controlling and describing the compositing process. Among the imaging operators provided in the language are: resize (zoom), blur, merge (over, in, out), tint, mix, offset and hue change. Time varying expressions are provided to interpolate image operator parameters over time.

When used in conjunction with ATOR, Combiner allows the user to spool a complex compositing job which contains multiple Alias 3D elements. Whenever Alias models change, Combiner automatically invokes Alfred to render the modified elements and recomposite results directly into final frames.

Pixar Classic Textures™

Pixar's Classic Textures CDs, Pixar One Twenty Eight and Pixar Classic Textures Vol. 2, are Pixar's custom collections of high-quality photographic textures. Pixar developed these distinctive material textures for use in its signature images and films. Each texture on these CDs was created by a professional photographer specifically for use in production quality digital imaging. Every texture was created using optimum lighting, scale and perspective. The texture collections incorporate a patented technology which allows the textures to be tiled seamlessly. As a result, when aligned and tiled to cover a large area the textures will appear as a single smooth image without breaks or lines. The Pixar folding process preserves the integrity of the original data; therefore, the textures can be scaled or post processed without any degradation in quality.

System Requirements

ATOR, Combiner and Alfred require an SGI R4400 or greater running IRIX 6.2. ATOR is compatible with Alias PowerAnimator v7.5 and above. The RenderMan Toolkit is available on various UNIX workstations.

The Pixar Looks CD is available for all Toolkit supported platforms. The Pixar Classic Textures CDs are available for any UNIX workstation which supports an ISO compatible CD drive and an application which can read TIFF format image files.

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